

## CLAIMS

1. A method for the continuous determination of the damage to at least one system (7) for post-treatment of the exhaust gases from an internal combustion engine (2), caused by the lubricating oil, the fuel and/or at least one lubricating oil additive and/or fuel additive used, characterized in that:

(i) a determined quantity of at least one radiotracer is used to modify the lubricating oil, the fuel and/or the additive for which the impact on the post-treatment system (7) is to be measured;

(ii) a measurement is taken of the quantity of radiotracer originating from the exhaust gases which has accumulated in the post-treatment system (7), this measurement being taken using a detector (10) which is sensitive to radiation emitted by the radiotracer that has accumulated in the post-treatment system (7);

(iii) the measurements taken by this detector (10) are transmitted to a programmed computer (11) which can convert these measurements into the degree of damage caused to the post-treatment system by the lubricating oil, the fuel and/or the additive(s).

2. The method as claimed in claim 1, characterized in that the lubricating oil, the fuel and/or the additive for which the impact is to be measured, is modified with a determined quantity of at least one radiotracer comprising Sr, Zn, Ca, S, P and/or Mg.

3. The method as claimed in claim 1, characterized in that the lubricating oil, the fuel and/or the additive for which the impact is to be measured, is modified with a determined quantity of at least one radiotracer comprising a short-lived radioactive element, particularly bromine 82, germanium-69 or technetium 99-m.

4. The method as claimed in claim 3, characterized in that the technetium 99-m is incorporated in the oil or

the fuel in the form of an aqueous solution of sodium pertechnetate  $\text{NaTcO}_4$ .

5        5. The method as claimed in claim 3, characterized in that the germanium-69 is incorporated in the oil or the fuel in the form of tetraalkylgermane.

6. The method as claimed in claim 1 or 2, characterized in that the radiotracer is activated by neutrons and/or by a proton beam before incorporation in this oil.

10        7. The method as claimed in either of claims 1 and 2, characterized in that the continuous determination of the damage to at least one system (7) for post-treatment of exhaust gases of an internal combustion engine (2), caused by a lubricating oil additive Adh, is carried out  
15 by introducing into the lubricating oil a quantity of activable EAhi species of identical composition to the additive Adh and substituting for an identical quantify of the additive Adh.

20        8. The method as claimed in either of claims 1 and 2, characterized in that the continuous determination of the damage to at least one system (7) for post-treatment of exhaust gases of an internal combustion engine (2), caused by a lubricating oil additive Adh, is carried out  
25 by introducing into the lubricating oil a quantity of activable EAhii species, having no effect on the properties of use of the oil, of which the quantity found and measured in the post-treatment system is correlated with the impact of the additive Adh.

30        9. The method as claimed in claim 8, characterized in that the additive Adh is a detergent containing calcium and in that the EAhii species in activated form is strontium-85.

35        10. The method as claimed in either of claims 1 and 2, characterized in that the continuous determination of the damage to at least one system (7) for post-treatment of exhaust gases of an internal combustion engine (2),

caused by the fuel, is carried out by introducing into the fuel a quantity of activable EAci species of identical composition to a fuel additive Adc and substituting for an identical quantity of said additive  
5 Adc in the fuel.

11. The method as claimed in either of claims 1 and 2, characterized in that the continuous determination of the damage to at least one system for post-treatment of exhaust gases of an internal combustion engine (2),  
10 caused by the lubricant, is carried out by introducing into the lubricating oil a quantity of an activable EAhi or EAhi species.

12. A device for the continuous determination of the damage to at least one system (7) for the post-treatment  
15 of exhaust gases of an internal combustion engine (2), caused by the lubricating oil, the fuel and/or at least one lubricating oil additive and/or fuel additive used, this device comprising means (3) for incorporating a determined quantity of at least one radioactive tracer in  
20 the lubricating oil or in the fuel, and, downstream of the engine (2), a system (7) for the post-treatment of the combustion gases originating from the engine, this device being characterized in that it comprises:

(i) a detector (10) sensitive to the radiation  
25 emitted by the radioactive tracer, installed near the post-treatment system (7) and at some distance therefrom, in order to measure a radiation emitted by the tracer particles that have accumulated in this system;

(ii) functionally linked to the detector (10), a  
30 programmed computer (11) which can convert the measurements taken by the detector into the degree of damage caused to the post-treatment system by the lubricating oil, the fuel and/or the additives.

13. The device as claimed in claim 12, characterized  
35 in that the post-treatment system (7) is selected from the group of oxidation catalyst systems, systems for

removing or reducing carbon oxides, and particulate filter systems.

14. The device as claimed in either of claims 12 and 13, characterized in that the detector (10) is a probe  
5 for detecting ionizing radiation.

15. The device as claimed in any one of claims 12 to 14, characterized in that it comprises a filter (9) placed on the combustion gas exhaust line, between the post-treatment system (7) and the point at which these  
10 gases are released into the atmosphere.